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Narcotic Drug Management Processes Practice: University Hospital Example

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Main Points

- The study examined the issue of implementing the drug management process in hospitals, especially in units where narcotic and high-risk drugs are used intensively, taking into account international/national quality standards.
- The unannounced inspections of the established narcotic team revealed that narcotic drugs could be preserved inappropriately to speed up the functioning, especially in units such as operating rooms where high-risk drugs are frequently used. This poses an undeniable risk in terms of patient and employee safety.
- As a result of the inspections, stock and space arrangements were made in drug stores and systemic adjustments were made for drug orders. It was decided that the establishment of a satellite drug store would be appropriate in terms of drug management in units where the use of drugs, especially high-risk drugs, is numerically high.
- The results of the inspection carried out in the operating room after the satellite drug store was established showed a 20% difference in drug consumption between the two separate periods. It seems that the actions taken on the basis of physicians, nurses, and pharmacists for the drug ordering process play an active role in drug returns and the prevention of medication errors.
- The results of the study show that a well-planned drug management process provides great benefits for ensuring patient and employee safety, reducing costs, ensuring service continuity, preventing uncontrolled circulation of drugs, preventing medication errors, and raising awareness of drug safety among employees.

Abstract

This study aimed to develop new recommendations to increase patient and employee safety in drug use, reduce medication errors, and especially control narcotic and high-risk drug use. In order to achieve this aim, the quality practices of Pamukkale University Hospitals for drug management and safety were evaluated with the numerical data obtained after the improvement. First, plans were created for pharmacies, operating rooms, intensive care units, and clinics in compliance with the Quality Standards in Health. Unannounced inspections were performed on the units in line with the determined procedures and instructions by creating teams. During the inspections, physical adjustments were made in the warehouses and systemic adjustments were made in drug demands. After these actions, a 20% difference in drug consumption was found in two separate periods. Controls on the basis of doctors, nurses, and pharmacists played an active role, especially in pharmacy management, drug returns, and prevention of medication errors. The results clearly show that the execution of the drug management process in hospitals ensures patient and employee safety, preventing the uncontrolled circulation of drugs and errors in practice and helping increase drug safety awareness among employees.

Keywords: Drug management system, narcotic drugs, patient and employee safety, quality standards in health

Introduction

Hospitals that are critical for public health should carry out patient safety and quality studies to provide quality healthcare services and prevent potential harm to patients. Institutions should also fulfill their duties in order to improve the quality culture (Korkmazer et al., 2016). Countries should establish strong healthcare systems for a healthy workforce and economic growth. However, the establishment and maintenance of these systems require not only ensuring patient safety but also protecting the safety and health of healthcare professionals, which we can define as the most valuable component of the system (Aldem et al., 2013; Courtenay & Griffiths, 2009). At this point, policies on drug management should be developed in hospitals to assure the safety of patients and healthcare workers, and drug inspections should be turned into an institutional policy (Küçükakça & Özer, 2016).

Within the scope of the Health Transformation Program, which was initiated in Turkey in 2004, the issue of healthcare quality has been addressed. Priority has been given to the preparation, development, regular monitoring, review, and updating of standards for a reliable and quality delivery of healthcare services. As a result of studies, the Quality Standards in Health (QSH) have emerged. The QSH has been recently updated to 2020 QSH-Hospital Version 6.1.

The QSH-Hospital has some important items in the set, which include patient and employee safety, continuous and effective access to services, patient orientation, information security and privacy, ethical value management, environmental awareness, efficient resource/stock management, and drug management (The Republic of Türkiye, Ministry of Health, 2022).

The most important component of this new restructuring system is drug management. Drug management consists of the sub-dimensions of providing safe, ethical, effective, and cost-effective healthcare services in the process, from planning the intake of drugs to evaluating the results they create in the patient (Akkan, 2014; Schür et al., 2016). Physical and technological differences are a barrier to the creation of the only valid and most appropriate drug management system. Therefore, health institutions should create their own ideal setting (the Republic of Türkiye, Ministry of Health, 2015). The increase in the number of patients and changes in treatment protocols have led to an increase in drug use in recent years. This increase has triggered possible system errors and detrimental consequences. For this reason, health institutions, personnel, patients, and their relatives have some responsibilities in the process of drug use (Chiapponi et al., 2016).

Defining roles and responsibilities to prevent mistakes in drug management, there is a need for making legal regulations thoroughly, carrying out continuous training activities, developing recording systems, using information technologies, eliminating infrastructure deficiencies, establishing effective communication, giving importance to team understanding, developing drug management standards, and creating treatment protocols (Kuğuoğlu et al., 2009).

Another critical aspect of drug management is addictive substance use among healthcare professionals. This is important for public health as it affects both the health of their own and the patients they care for. Easy access to substances, erosion of the taboo against the use of injections and opiates, and professional challenges negatively affect the rate of substance abuse among healthcare workers (Akvardar et al., 2002; Bodnar, 2008; Ozawa et al., 2001).

Inventory management of drugs, which is the largest consumable item in hospitals, is almost as important as ensuring drug safety. Hospitals need a certain stock to avoid interruptions in the examination and treatment phases of their structures or to meet any immediate needs. Therefore, the establishment of an efficient and effective stock structure is of great importance not only for the continuous provision of services but also controlling the entrances and exits, invoicing drugs without leakage, and ensuring supervision (Iannone et al., 2013).

Objective of the Study

Based on the abovementioned studies on drug management, this study aimed to increase patient and employee safety in drug use, develop new recommendations for reducing medication errors, create a cost-effective stock management system in warehouses, regulate the use of narcotic drugs, and ultimately contribute to quality standards in health and literature by sharing the results.

Methods

The study included quality management system implementations made by Pamukkale University Hospitals using the "plan, do, check, act" (PDCA) methodology. Ethics committee approval was received from the Ethics Committee of Pamukkale University Non-Invasive Clinical Research (Approval No: 227622). In this context, planning, purchasing, accepting, storing, managing the ordering process, implementing, post-implementation observation, and keeping necessary records of drugs needed are the basis of the study. The study, which can also be described as ensuring drug safety, was conducted within the scope of QSH-Hospital drug management standards. The study was carried out in the units and clinical departments where drugs are used in Pamukkale University Hospitals. In order to gain general acceptance and not be open to discussion, of the 15 standards of QSH drug management, only those with conclusive results were included in the study scope. Relevant standards and implementations are given in Table 1.

The results on the stock management of narcotic drugs and employee safety were obtained as a result of a detailed comparison of the data on the exits from the pharmacy to the operating room and the exits of the operating room satellite drug store. In addition, the data obtained by using the systems created in the drug management process for drug return, drug destruction, medication error, and adverse effect notifications were evaluated within the scope of the study.

Drug management actions were carried out over the Hospital Information Management System (HIMS) in line with the QSH Drug Management standards. Plans were made for the pharmacy, drug store, operating room, intensive care units, and other areas within the hospital. First of all, adjustments were made to the procedures and instructions. Unannounced inspections were carried out in line with the adjustments made by establishing

Table 1.
Quality Standards in Health – Hospital Drug Management Standards and Actions Taken

Standard	Actions
S01: The responsible persons and their responsibilities related to drug management should be defined.	Establishment of a drug management team Instruction of the drug management team's responsibilities Guideline on control of antibiotic use and surgical antibiotic prophylaxis
S04: There should be regulations for the storage of drugs.	Drug safety and management procedure Emergency drug release (EDR) follow-up form Green and red prescription drug handbook Drug and serum follow-up form Pharmacy temperature – humidity monitoring form Regulation instruction for the risks that may occur in areas where the drug is kept for more than 24 hours, according to the conditions of the pharmacy and the store
S05: Rules regarding drug orders should be determined.	Drug safety and management procedure Physician order procedure Verbal prompt application instruction List of abbreviations that should not be used in drug applications
S9: Regulations should be made for adverse effect notification.	Drug safety and management procedure Adverse effect notification instruction
S11: Regulations should be made for narcotic and psychotropic drugs.	Drug safety and management procedure Green and red prescription drug handbook Report on the disposal of unused parts of drugs containing narcotic and psychotropic substances Drug breakage, loss, etc. event form

teams. Afterward, systematic adjustments were made for the stock, space arrangements, and orders made to the pharmacy in the drug store. It has been observed that these actions ensure the efficiency of drug use and the safety of the drug management process, creating awareness among employees and ensuring systematic stock control.

The data regarding the results were retrieved from the HIMS Drug Management database with the help of Structured Query Language commands. One year of retrospective data from the drug management module was used in the analysis. The aim was to observe the change in drug use of the unit in the satellite drug store created as a result of narcotic inspections in Pamukkale University Hospitals. For this, the drugs transferred from the pharmacy's main drug store to the operating room unit in the last 6 months of 2021 and the drugs that were released from

the operating room satellite drug store in the first 6 months of 2022 were examined in two separate tables. Moreover, surgical, patient, and anesthesia data from two different periods were also queried in the operating room database. In order to make the data suitable for analysis, the Microsoft Excel spreadsheet software was used and subjected to a thorough cleaning. During the data cleaning phase, expert opinions of the Operating Room Chief Anesthesia Technician and Chief Pharmacist were used. Throughout the study period, 109,394 drug movements of 15,746 patients were retrospectively analyzed. In the continuation of the study, implementations regarding the drug management process throughout the hospital are included.

Actions for High-Risk Drugs
An inspection team was established to ensure the management of psychotropic, narcotic, and high-risk drugs. The aim was to prevent possible risks to employee and patient safety. With the instant inspections carried out by the team in the hospital, it was ensured that the drugs were administered to the patient in line with the physician's order, recorded in the necessary documents, and the records of disposals and returns were kept. After the inspections, adverse event notifications, drug lists, stock control, and updates were made.

The deficiencies and unfavorable practices of the units and the pharmacy were corrected after the inspections. An order system with a digital signature was introduced for narcotic and psychotropic drugs. In order to prevent the abuse of drugs, it was decided to contact the Psychiatry Department for mood measurement of the personnel.

With the inspections carried out in the operating room, it was observed that the narcotic and anesthetic drugs to be used were prepared in an uncontrolled manner before the patient entered the operating halls. In addition, it was found that operating room drug orders were generally made more than needed, causing waste and large amounts of returns. It was determined that the transfer of the drugs to be used for the patient in the operating room from the clinic leads to undesired situations such as breakage and loss of the drugs. In order to prevent these problems, it was decided that establishing a satellite drug store would be appropriate in terms of drug management, especially in units where the use of high-risk drugs is numerically high. This decision was first implemented in the operating room.

For the narcotic and psychotropic drugs used in the operating room, an order system in the name of the patient was introduced. It was ensured that these drugs delivered for the patients who will receive infusions are sent in the form of vials, while the drugs delivered for other patients who will use low doses were sent in an ampoule format.

The registry of high-risk drugs in the pharmacy was compared with daily and monthly HIMS consumptions and archived. It was ensured that these drugs are kept in locked areas of the clinics and recorded in the relevant books during the delivery.

Actions for Clinics
It was ensured that pharmacists and clinicians monitor the department stocks together and make expiration checks. The drug follow-up list of the relevant clinic was sent from the pharmacy

at the beginning of each month, and this list was checked and signed by the physician and the responsible nurse and sent back to the pharmacy.

It was observed that the amount of drugs used for the patients did not match the amount ordered on the HIMS Drug Order Screen. It was also noted that some patients did not want the drug. A procedure was introduced to create a daily treatment plan by the physician through HIMS. Controls were developed to order the amount of drug used for each patient. The tablets were delivered to the wards in separate, patient-specific ziplock bags from the packaging machines.

It was ensured that the drugs brought by the patient were checked by the nurse, received, and recorded in the relevant form. A procedure was initiated to deliver these drugs to the patient/patient relatives by the ward nurse by checking them during discharge. In addition, unused drugs delivered by the hospital pharmacy were electronically returned to the pharmacy by the personnel after being deducted from the inventory record.

Actions for the Pharmacy

Drugs were purchased, received, and stocked based on the essential drugs list created in accordance with the stock layout plan. Access to the stores was prevented except for authorized personnel by providing personnel authorization to the storage areas. Cold chain compliance was achieved. Temperature and humidity checks were performed in the storage areas. It was ensured that control, disposal, and separation of impaired and expired drugs were performed at the source.

Results

This section dwells on observable results of the improvement and correction of nonconformities mentioned earlier regarding the drug management process. In our study, the narcotic team established to ensure control within the hospital during the drug management process carried out the first unannounced inspection in the operating room unit and the second unannounced inspection in the pharmacy's main drug store. These inspections showed that the inadequacy of the existing operating rooms and the intensive patient circulation led to case admissions until midnight. The query of surgeries on an hourly basis from HIMS revealed that the data were not entered on time and no reliable data could be obtained. However, it was learned from the operating room's responsible nurse and chief anesthesia technician, whose expert opinions were taken in advance, that the rate of surgeries performed after working hours was approximately 25% of the total number of surgeries. Furthermore, it was understood from the shift lists that the personnel worked an average of 30 hours of overtime per month. Based on this observation, it was concluded that the insufficient number of personnel, busy working hours, and fatigue resulted in careless practices.

As a result of the abovementioned deficiencies in the operating rooms, where personnel from different departments work with very different disciplines, one of the most disruptive processes was the uncontrolled medication orders. The inspection of the team revealed that unused drugs for the previous patients were carried in the pocket or improperly stored in the drawers for

Table 2.
Operating Room Narcotic Inspection Report

Interviews and Decisions

1. The number of drugs present in the operating halls is high.

2. The amount of drugs used for the patients does not match the amount ordered on the HIMS Drug Order Screen. The amount of drug to be used should be ordered for each patient.

3. It has been observed that the narcotic and anesthetic drugs to be used in the patients to be operated are prepared uncontrollably before the patient enters the operating room. It was observed that the drugs ordered on behalf of the previous patient were carried in pockets and drawers in order to reach the drug quickly in the next patient.

4. Propofol cabinet in the anesthesia technician's room is not under control and may cause abuse.

5. Demanding narcotic drugs and other drugs in excess of the need leads to drug waste and large amounts of medicines are returned to the pharmacy.

6. In line with the management decision, the personal cabinets of two anesthesiologists under the supervision of a faculty member, five anesthesia technicians under the supervision of chief anesthesia technician, and three nurses under the supervision of responsible nurse were checked by them for narcotic and anesthetic drugs.

7. A satellite pharmacy should be established to prevent drug waste in the operating room, to enter the correct amounts of drugs into the patient's account, and to control drugs that may be abused.

8. Since delivery of the patient's drugs to be used during surgery from the clinic may cause situations such as breakage and loss, the drugs should be distributed in a controlled manner from a single place.

use on the next patients, especially for accessing them quickly (Table 2). It was determined that this situation posed an undeniable risk to patient and employee safety and was a managerial deficiency that needs to be resolved in terms of stock management and cost.

As a result of the inspections, it was decided to establish a satellite drug store in the operating room. The 6-month period before and after the establishment of this satellite drug store was assessed retrospectively. Accurate measurement of changes in drug use in the operating room cannot be achieved by simply comparing equal time periods. In addition, the use of the operating room in two different periods should also be measured. The most obvious indicator of the use of the operating room is the surgical data. The comparison of the number of surgeries, operated patients, and patients given anesthesia for the two mentioned periods is given in Table 3.

As can be seen from the table, there is a 5% increase in the number of surgeries in favor of the second period. In this case, it can be expected that drug use will either remain the same or be in favor of the second period without any other external effect. In the continuation of the study, the change in drug use during two different periods was examined. Table 4 shows the changes in frequently

Table 3.
Comparative Surgical Data

Surgery Data	First Period—Last 6 Months of 2021, Numbers (*n*)	Second Period—First 6 Months of 2022, Numbers (*n*)	Change, Percentage (%)
Group A surgeries	2058	1978	
Group B surgeries	3240	4404	
Group C surgeries	3934	4008	
Group D surgeries	4632	4231	
Group E surgeries	770	903	
Total number of surgeries	14,634	15,524	106.08
Patient undergoing surgery	7694	8052	104.65
Patient given anesthesia	7715	8145	105.57

used drugs by their active ingredients before and after the establishment of the satellite drug store. The last purchase price of the drug is used in the table against the possibility of change.

The analysis of the data showed that despite the 5% increase in the number of second-period surgeries, a saving of approximately 15% was achieved in the number of drugs and a saving of approximately 13% in the drug cost. The cost of the 20 m² satellite drug store that was established in the operating room to achieve this saving and to carry out the drug delivery in a healthy way was approximately 55,000 ₺. No additional personnel was assigned by the pharmacy for the operating room satellite drug store, only the personnel responsible for the operating room unit in the main drug store was assigned to the operating room for this task. Therefore, even when all possible expenses are added, the picture is surprisingly beneficial for the period when the satellite drug store was established. It should also be noted that this was achieved by comparing drug use for only 6 months. These results revealed that approximately 20% of the drugs were wasted before the satellite drug store was established. In addition to all these benefits, the effective control mechanism at the place of use of the drug in the operating room prevented wrong dosing, wrong drug order, and wrong storage. The evaluation of the establishment of a satellite drug store for the same period in terms of risky use of narcotic and anesthetic drugs showed a saving of 4580 in the number of drugs and approximately a saving of 250,000 ₺ in the drug cost. It is also obvious that the uncontrolled circulation of these drugs can lead to undesirable events in terms of patient and employee safety.

Drug returns, drug disposal, and adverse event notifications were examined to correct the nonconformities identified throughout the hospital. The results showed that the control mechanisms established to minimize the circulation of drugs in the field worked and the relevant personnel ensured control at every stage. Comparisons of drug use between the last 6 months of 2021 and the first 6 months of 2022 are given in Table 5.

As can be seen from the table, there is a decrease in the number of drug returns and disposal in favor of the second period. Especially the number of disposed red/green prescription drugs decreased by more than half. It was understood that delivering the vial form of the drug for patients using infusion in the intensive care unit and operating room, delivering the ampoule form of the drug for patients using low doses, and establishing

a satellite drug store reduced the number of drug disposals. The analysis of the decrease in the number of returns on the basis of different parameters revealed that only "excess order returns" remained approximately the same in both periods. In contrast, in the second 6-month period after the actions were taken, the numbers for each reason for return (death, discharge, change of department, or treatment plan) decreased by 25%.

Adverse event notification is the detection of medication errors, especially those made in the pharmacy, with the help of control mechanisms created in the system or in the field during drug management improvement studies. It is understood from the notifications received three times more compared to the past that in addition to the error detection, the improvement worked and also created awareness among the personnel.

Discussion

This study evaluated quality improvements for drug management and safety in a university hospital pharmacy, clinics, and operating room with relevant numerical data. The results showed that the actions taken especially on the basis of physicians, nurses, and pharmacists for the drug ordering process play an active role in pharmaceutical management, orders, returns, and prevention of medication errors. As a result of the relevant notices and inspections, awareness of healthcare professionals increased. In order to prevent medication errors, the control mechanism in the drugs ordered in the name of the patient was improved.

The actions taken within the scope of QSH drug management throughout the hospital provided administrative, financial, and managerial benefits. Especially the comparison of the periods before and after the establishment of the satellite drug store in the operating room showed a saving of approximately 20% in drug consumption. The major reason for this result is the non-refundability of the unused drug ordered in bulk from the main drug store.

The proper operation of drug management in operating rooms directly affects the safety and reliability of the surgery. Failure to clarify responsibilities and processes poses a problem for high-risk drug use. A study examining the addictions of healthcare professionals by their specialties found the highest rate in anesthesiology with 87%, followed by psychiatry with 72% (Dadak et al., 2019). For this reason, it is necessary to ensure the control

Table 4.
Change in Drug Consumption

Active Ingredient	First-Period Drug Use, Numbers (*n*)	Second-Period Drug Use, Numbers (*n*)	Price (₺)	Total Cost (₺)
20% dextrose 500 cc	146	6	5.17	723.97
20% mannitol 150 cc	836	572	4.57	1205.21
PPI IV omeprazole 40 mg, pantoprozole sodium	362	0	5.48	1,984.90
Norepinephrine bitartrate 4 mg/4 mL IV ampoule	1166	880	1.81	517.06
Adrenaline 1 mg/mL 1 mL ampoule	1356	843	1.22	627.40
Aminophylline 240 mg IV ampoule	518	161	1.26	450.71
Acetaminophen 10 mg/mL 100 mL	3993	1880	4.31	9110.39
Atropine sulfate 1 mg/mL 1 mL ampoule	5145	3404	0.36	633.03
Bupivacaine hydrochloride 5 mg/mL 20 mL	288	355	3.35	−224.66
Desflurane 240 mL solution	40	200	248.50	−39,831.44
Fentanyl 0.05 mg/mL 10 mL	214	667	11.05	−5005.65
Fentanylcitrate 0.1 mg/2 mL ampoule	1011	341	1.36	913.55
Furosemide ampoule	1182	657	0.71	372.24
Gelatine 40 g solution 500 mL	615	0	18.77	11,540.97
Glyceryl trinitrate 10 mg/10 mL ampoule	1906	1103	3.33	2672.34
Heparin sodium 25,000 IU vial	520	803	22.59	16,197.51
Hes 6% (130/0.4) 500 mL IV infusion	839	760	18.08	1428.16
Isolyte 1000 cc	13,183	14,382	4.79	−5743.73
Isotonic1000 cc	817	1523	4.47	−3154.58
Isotonic 100 cc	6	5770	2.92	−16,807.07
Isotonic 150 cc	7631	6451	3.14	3702.21
Calcium gluconate 225 mg/10 mL	738	506	1.45	337.42
Lidocaine HCl 20 mg/mL 5 mL ampoule	3,808	3,418	0.61	239.24
Magnesium sulfate 15% 10 mL ampoule	977	292	0.68	468.38
Methylprednisolone sodium succinate 20 mg	232	441	5.73	−1197.32
Methylprednisolone sodium succinate 250 mg	67	189	14.53	−1772.10
Methylprednisolone sodium succinate 40 mg	3153	1245	2.20	4195.25
Neostigminemethylsulfate 0.5 mg/mL ampoule	753	2312	2.04	−3177.71
Norepinephrine 50 mg	544	7	39.99	21,472.43
Propofol 1000 mg/50 mL (2%) 50 mL vial	47	114	34.46	2317.86
Propofol 200 mg/20 mL (1%) ampoule	11,800	7942	5.93	22,865.13
Protamine sulfate 5000 IU/5mL ampoule	1721	1053	8.31	5552.62
Remifentanil HCl 2mg vial	1761	1970	16.26	−3,398.55
Rocuronium bromide10 mg/mL 5 mL vial	10,138	7969	13.30	28,849.87
Cefazolin 1 g IM/IV vial	750	1185	7.17	−3119.39
Sevoflurane 250 mL liquid	1280	882	537.95	214,401.69
Sodium bicarbonate 8.4% ampoule	1966	1127	0.80	671.20
Sugammadex sodium 100 mg/mL 2 mL IV vial	2223	1924	193.82	57,951.88
Tobramycin 0.3% eye ointment 5 g	243	9	12.76	2984.97
Tramadol HCl 100 mg/2 mL ampoule	659	1698	3.31	−3442.00
Tranexamic acid 100 mg/mL 2.5 mL ampoule	462	2,135	1.29	−2162.85
Tranexamic acid 250 mg/5 mL ampoule	3663	1858	1.72	3099.19
Vecuronium bromide10 mg IV vial	1	539	8.98	−4830.65
Total	97,917	86,662		324,525.05

Table 5.
Drug Return, Disposal, and Adverse Event Notifications

	Last 6 Months of 2021, Numbers (*n*)	First 6 Months of 2022, Numbers (*n*)	Change, Percentage (%)
Drug order returns	21,086	17,616	83.54
Red/green prescription drug returns	1618	1398	86.40
Drug disposal	1454	658	45.25
Red/green prescription drug disposal	1327	658	49.58
Adverse event notification	17	58	341.1

and supervision of drugs, especially in areas such as operating rooms, intensive care, and emergency department where access to substances is easy.

Another study made some recommendations for ensuring drug safety in operating rooms. These recommendations are to establish a scientific and reliable drug management system, prevent abuse, identify special personnel to ensure timely supply of drugs, monitor drug stocks in the operating room periodically, collect expired drugs, create procedures and instructions and implement them strictly, train personnel regularly, keep high-risk drugs in separate locked areas, and perform regular stock-taking (Ma, 2019). Considering the studies conducted within the scope of this study, it seems that almost all of the recommendations have been fulfilled. In our study, inspection teams were established, personnel were trained, and a reliable drug management system was created by following quality procedures.

Our study demonstrated that it is difficult to control the operating room drug stock via the main drug store of the pharmacy. With the satellite drug store established to ensure full control, the risk of medication errors for the practitioner working with pre-prepared drugs was eliminated as well. Although the number of studies on this subject is limited in the literature, 58.88% of anesthesiologists in a study stated that they always and frequently used drugs prepared by someone else. Moreover, 98% of the participants stated that a technician or an equivalent assistant could take medicine in an emergency situation (Pamuk et al., 2007). Thanks to the satellite drug store, it was ensured that the practitioner himself/herself took the drug from the store in the name of the patient, prepared and administered to the patient.

A study conducted in a large 1500-bed teaching hospital in South Africa reported that cost-saving measures had to be implemented since the annual drug budget was exceeded each year. A detailed inspection was carried out with the expert groups and the Drug Control Committee. With measures such as increasing awareness of the employees, especially physicians, about drug costs, paying attention to expensive agents, removing non-essential drug use, preferring cheaper equivalent drugs and limiting the use of some drugs, the annual budget allocated to drugs was not exceeded

and the increasing curve in previous years was reversed. As a result of all the measures taken, a saving of 20% was achieved in general (Pillans et al., 1992). This result is in line with the saving of 20% achieved with the measures taken in our study such as increasing awareness of operating room personnel about drug use, on-site and instant control, drug order template, and return system.

The inspections performed in the hospital revealed that the returns of unused drugs ordered in bulk from the main drug store of the pharmacy using templates were not carried out properly. It was also determined that the drugs were not returned by the physician or personnel and were stored in drawers or kept in pockets, which do not comply with the drug storage conditions for use in other patients. This led to the inability to ensure patient and employee safety, as well as the uncontrolled circulation of many drugs by the personnel.

With the new system requiring electronic signatures, physicians can order drugs through a computer and view and access patient information in each operating room. After being approved by the officer working in the satellite drug store, the ordered drugs can be taken from the store. Since the orders are made directly for the relevant patient through the system, returns can also be made easily. In conclusion, this improvement provided an improved, continuous, on-site, patient-based, and instantaneous control mechanism instead of the management efforts from the remote main drug store of the pharmacy where drug use and high-risk drug movement are so intense.

These results show that drug management improvements should be carried out uninterruptedly to ensure an effective management process in hospitals. It will be difficult to reach the goals of drug management in health institutions if it is not considered with a quality management approach. The results of this study clearly demonstrate that the implementation of drug management in hospitals by observing international/national quality standards helps achieve the following gains:

- Ensuring patient and employee safety,
- Reducing costs,
- Ensuring service continuity,
- Establishing an effective stock control mechanism,
- Preventing the uncontrolled circulation of drugs in the hospital,
- Preventing medication errors,
- Raising awareness of drug safety among employees.

Limitations and Directions/Suggestions for Future Research
It should be noted that the measures taken to improve the drug management process in this study are limited to public hospital employees and systems. As stated in other studies, rational drug use is not limited to physicians, nurses, pharmacists, and patients. The subject is closely related to public health policies, drug distribution and sales companies, habits, and technological infrastructure (Bao et al., 2013). Furthermore, in order to ensure the safety of patients and healthcare professionals, policies related to drug management should be constantly followed and developed, and necessary plans should be made for the implementation of quality improvements.

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Genişletilmiş Özet

Giriş

Bu araştırmada, bir üniversite hastanesi eczanesi, klinikleri ve ameliyathanesinde ilaç yönetimi ve güvenliği adına yapılan kalite çalışmaları, iyileşmeye yönelik elde edilen sayısal verilerle değerlendirilmiştir. Sağlık çalışanları arasındaki bağımlılık yapıcı madde kullanımı ilaç yönetiminde dikkat edilmesi gereken en önemli hususlardan biridir. Bu durum, hem kendi sağlıkları hem de baktıkları hastaları etkilediği için toplum sağlığı açısından önemlidir. Özellikle maddelere kolay ulaşabilme, enjeksiyon - opiyat kullanımına karşı tabunun aşınması ve mesleki zorluklar sağlık çalışanlarının arasındaki madde kullanım oranını olumsuz yönde etkilemektedir. Pamukkale Üniversitesi Hastanelerinde yapılan çalışmada, ilaç kullanımında hasta ve çalışan güvenliğini artırmak, ilaç hatalarını azaltmak adına yeni öneriler geliştirmek, narkotik ilaç kullanımlarını kontrol altına almak ve nihayetinde elde edilen veriler ışığında kalite çalışmalarına ve literatüre katkıda bulunmak amaçlanmıştır.

Materyal ve Metot

Çalışmalara Sağlıkta Kalite Standartları (SKS) rehberliğinde öncelikle eczane, ameliyathane, yoğun bakımlar ve kliniklerle ilgili planlamalar yapılarak başlanmıştır. Ekipler kurularak tanımlanan prosedür ve talimatlar doğrultusunda ilgili birimlere habersiz denetimler yapılmıştır.

Narkotik ekibi, habersiz ilk denetimini Ameliyathane ünitesinde gerçekleştirmiştir. Devamında ise kliniklerde ve eczanede denetimler yapılmıştır. Ameliyathane denetimlerinde özellikle mevcut ameliyathane salonlarının yetersiz olmasının ve yoğun hasta sirkülasyonunun, gece yarılarına sarkan vaka alımlarına yol açtığı tespit edilmiştir. Bu durum yetersiz personel sayısıyla çalışmaya, yoğunluğa, yorgunluğa ve bunların tetiklediği dikkatsiz çalışmaya yol açtığı görülmüştür. Ekibin yaptığı çalışmalarda, ilaç istemlerinin kontrollü şekilde yapılmadığı ve vaka alımlarının hızlı bir şekilde yapılabilmesi adına hasta adına kullanılmayan ilaçların bir sonraki hastada kullanılması amacıyla cepte taşındığı ya da uygunsuz şekilde çekmecelerde saklandığı tespit edilmiştir. Bu durumun, hasta ve çalışan güvenliği açısından göz ardı edilemez bir risk oluşturduğu, benzer şekilde stok yönetimi ve maliyet açısından da çözülmesi gereken yönetimsel bir kusur olduğu belirlenmiştir.

Ayrıca ameliyata girecek hastalara kullanılacak narkotik ve anestezik ilaçların hasta ameliyathane salonuna girmeden önce kontrolsüz bir şekilde hazırlandığı görülmüştür. Ameliyat olacak hastanın ameliyathaneye gelirken kullanacağı ilaçların klinikten gönderilmesinin ilaçlarda kırılma, kaybolma ve benzeri durumlara yol açtığı tespit edilmiştir. Ameliyathaneden narkotik ve diğer ilaçların istemlerinde, ihtiyaç olandan fazla sayıda ilaç istenmesinden dolayı kullanım kontrolü sağlanamadığı, israfın olduğu ve eczaneye büyük miktarlarda iade ile uğraşıldığı görülmüştür.

Denetimler sonucunda ilaç depolarında stok ve mekân düzenlemeleri, ilaç istemlerinde ise sistemsel düzenlemeler gerçekleştirilmiştir. İlaç kullanımının, özellikle yüksek riskli ilaç, yeşil ve kırmızı reçeteli ilaç kullanımının sayısal olarak fazla olduğu birimlerde, cep eczane kurulmasının ilaç yönetimi açısından uygun olacağına karar verilmiştir. Bu karar ilk olarak Ameliyathanede uygulanmıştır. Oluşturulan cep depoyla hastanın ameliyatta kullanacağı ilaçların tek bir yerden kontrollü verilmesi sağlanmıştır. Kullanım, stok ve miat takiplerini yapmak üzere bir personel görevlendirilmiştir. Ayrıca ameliyathane ilaç istemlerinin daha kolay ve kontrollü bir şekilde yapılabilmesi için hazır ilaç şablonları oluşturulmuştur.

Kliniklerde ise yüksek riskli ilaçların kilitli alanlarda muhafaza edilmesi ve her nöbet değişiminde devir teslim edilerek kayıt altına alınması sağlanmıştır. Ek olarak bu ilaçların dolaptaki yerleşimi muhtemel hataları önleyecek şekilde diğer ilaçlardan ayrı yapılması sağlanmıştır. Bir diğer önemli husus tedavi planının hekim tarafından HBYS üzerinden elektronik order sistemiyle günlük olarak yazılması yöntemine geçilmesidir.

Sonuç

Narkotik ilaçların yönetimine dair elde edilen bulgular, ilk dönemdeki Eczane deposundan Ameliyathane ünitesine yapılan ilaç çıkışlarıyla, son dönemdeki Ameliyathane cep deposu çıkışlarının karşılaştırılması sonucu elde edilmiştir. Analizde, ilaç yönetim veri tabanından Yapısal Sorgulama Dili yardımıyla elde edilen geriye dönük bir yıllık ilaç verisi kullanılmıştır.

Sonuçlar hastane genelinde SKS ilaç yönetimi kapsamında yapılan çalışmaların idari, mali ve yönetsel açılardan fayda sağladığını göstermiştir. Özellikle ameliyathane cep deposu oluşturulduktan sonra yapılan incelemenin sonuçlarına göre iki ayrı dönemdeki ilaç tüketimi arasında yaklaşık yüzde 20 fark vardır. İlaç istem sürecinde özellikle Doktor, Hemşire ve Eczacı temelinde yapılan kontrollerin, eczane yönetimi, ilaç iade ve hatalarını önlemede etkin rol oynadığı görülmektedir. Yapılan iyileştirme çalışmalarının aynı zamanda personeller arasında farkındalık oluşturduğu, İstenmeyen Olay Bildirim Sistemine eskiye göre üç katından fazla gelen bildirimlerden anlaşılmaktadır.

Ayrıca hastane genelinde belirlenen uygunsuzlukların düzeltilmesi adına yapılan çalışmaların gözlemlenebilen sonuçlarına dair olarak ilaç iade, imha ve istenmeyen olay bildirimleri incelenmiştir. İlaç iade ve imha sayılarında ikinci dönem lehinde azalmaların olduğu tespit edilmiştir. Özellikle Kırmızı/Yeşil Reçeteli ilaç imha sayılarının yarıdan fazla azaldığı görülmektedir. Yapılan incelemede, infüzyon kullanan hastalara flakon formatı, düşük doz kullanan hastalara da ampul formatının gönderilmesi ve cep depo açılması önlemlerinin ilaç imha sayılarında azalma sağladığı anlaşılmıştır. Önlemler alındıktan sonraki ikinci altı aylık dönemde, her bir iade sebebi bazında (ölüm, taburcu, servis ya da tedavi planları değişimleri) sayılar %25 azalmıştır. Sonuçlar, sahada ilaç dolaşımının en aza indirilebilmesi adına oluşturulan kontrol mekanizmalarının işe yaradığını, ilgili personellerin her aşamada kontrolü sağladığını göstermektedir.

Tartışma

Hastanelerin özellikle ameliyathane gibi farklı uzmanlık alanlarının bir arada kesintisiz hizmet verdiği birimlerinde, sorumlulukların ve süreçlerin netleştirilmemesi, yüksek riskli ilaç kullanımında sorun oluşturmaktadır. Sağlık çalışanlarının bağımlılıklarının incelendiği çalışmalarda, ameliyathane, yoğun bakım, acil servis gibi maddeye ulaşımın kolay olduğu yerlerdeki ilaçların kontrolü ve denetiminin sağlanması gerektiği görülmektedir. Yapılan bu uygulamayla, ilaç kullanımının ve yüksek riskli ilaç hareketinin yoğun olduğu ünitelerde, uzaktaki eczane ana deposundan yapılmaya çalışılan kontrol faaliyetlerinin yerine, geliştirilmiş, sürekli, yerinde, hasta bazlı ve anlık bir denetim mekanizması oluşturulmasının faydaları ortaya konmuştur.

Bu araştırmanın sonuçları açık bir şekilde ortaya çıkarmıştır ki, hastanelerde ilaç yönetim sürecinin uluslararası/ulusal kalite standartları gözetilerek yürütülmesi, hasta ve çalışan güvenliğinin sağlanması, ilaçların hastane içinde kontrolsüz dolaşımının engellenmesi, ilaç uygulamalarında hatalarının önlenmesi, maliyetlerin azaltılması, hizmet sürekliliğinin sağlanması, denetime açık etkin bir stok mekanizmasının oluşturulması ve çalışanlarda ilaç güvenliğine dair farkındalığın oluşturulmasında yardımcı olmaktadır.

Çalışmada ilaç yönetim sürecinin iyileştirilmesi adına alınan önlemlerin, kamu hastanesi çalışanları ve sistemleri ile sınırlı olduğu unutulmamalıdır. Akılcı ilaç kullanımı sadece doktor, hemşire, eczacı ve hastayla sınırlı bir konu değildir. Konu kamu sağlık politikaları, ilaç dağıtım ve satış firmaları, alışkanlıklar ve teknolojik altyapı ile de yakından ilgilidir. Ayrıca hasta ve sağlık çalışanı güvenliğinin sağlanması adına ilaç yönetimi ile ilgili politikalar sürekli takip edilerek geliştirilmeli, kalite çalışmalarının yürütülmesi için gerekli planlamalar yapılmalıdır.